The question of waste-heat utilization must be considered upon an economic basis. A further factor to be taken into account is the question of dividing the heat, which leaves the laboratory of the furnace, between the regenerators and the waste-heat steam generator. The higher the temperature at which the gases are passed to the boiler, the greater its steam-generating capacity; there is thus a possibility of reducing the cost of the regenerator. The whole question of the design of the open-hearth shop and its equipment is a matter of compromise and of balancing one thing with another in order to secure a desired result—ingot tonnage of the desired quality, at a profit.

In the foregoing discussion, producer gas has been the only fuel considered. The fuel question depends largely upon local conditions for the particular plant. Natural gas and coke-oven gas eliminate the producer plant; but in many localities natural gas is becoming scarce and coke-oven gas is not available at a price and in a quantity which will permit its use. Tar is used in a few plants, in order to get rid of the enormous quantities produced by the by-product coking plants. Water gas has been used, as well as blast-furnace gas mixed with producer or some other gas; but the use of these last was more or less forced by war conditions. Pulverized coals are used, as is also oil, which may be atomized by steam or compressed air, or by mechanical means. Pulverized coal adds a certain proportion of its ash to the normal cinder, while finer portions are carried further and about 25 per cent of ash passes out of the stack suspended in the gases. With most of these fuels, only the air is preheated.

One of the most important elements in the fuel for an open-hearth is. sulphur. The less sulphur present the better; it has a tendency to pass into the cinder and metal, under certain conditions, adding to the expense and time of the melt.